
Risk Management Process at JAXA

December 7, 2005

NASA Risk Management Conference 2005

Nobuo Takeuchi

Tsutomu Fukatsu

Human Systems Safety and Mission Assurance Office

Japan Aerospace Exploration Agency (JAXA)

takeuchi.nobuo@jaxa.jp
fukatsu.tsutomu@jaxa.jp

This presentation is prepared for NASA Risk Management Conference VI to present Safety Risk Management System of Japanese elements and payloads which will be attached to or installed in the International Space Station.

Japanese Elements and Payloads



- Japanese Experiment Module (JEM-Kibo)

JEM will be attached to the ISS to conduct experiments both in the pressurized and un-pressurized environment in the year 2007-2008.(TBD)

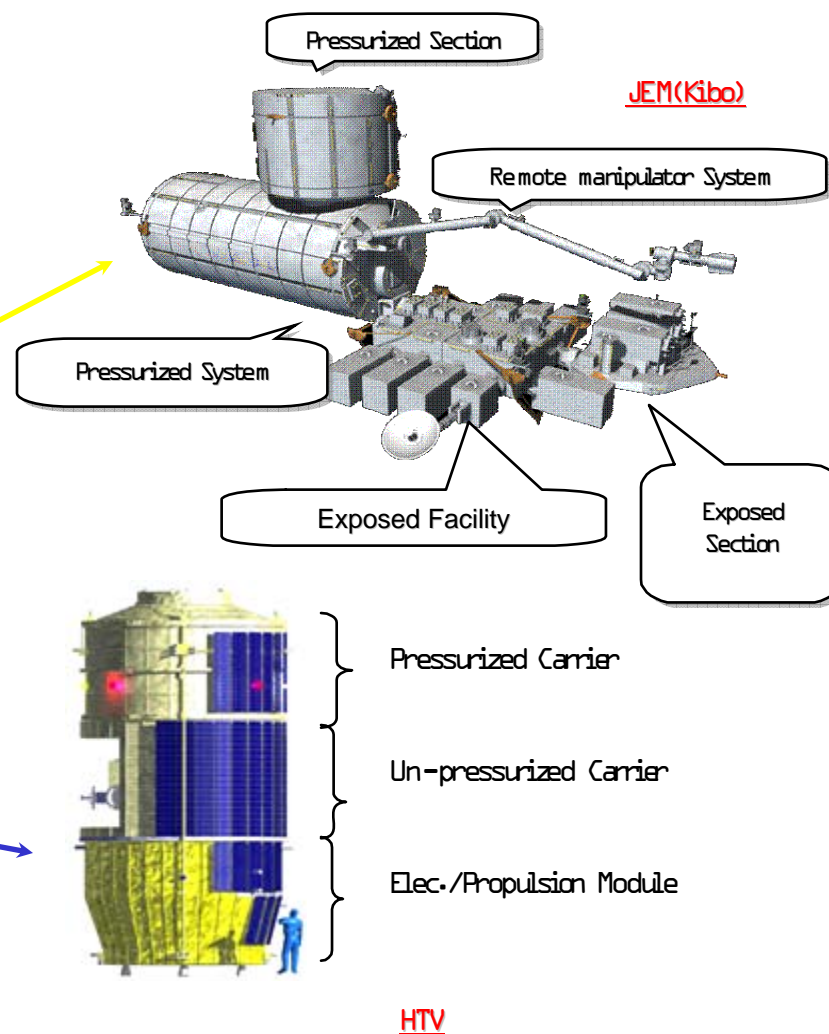
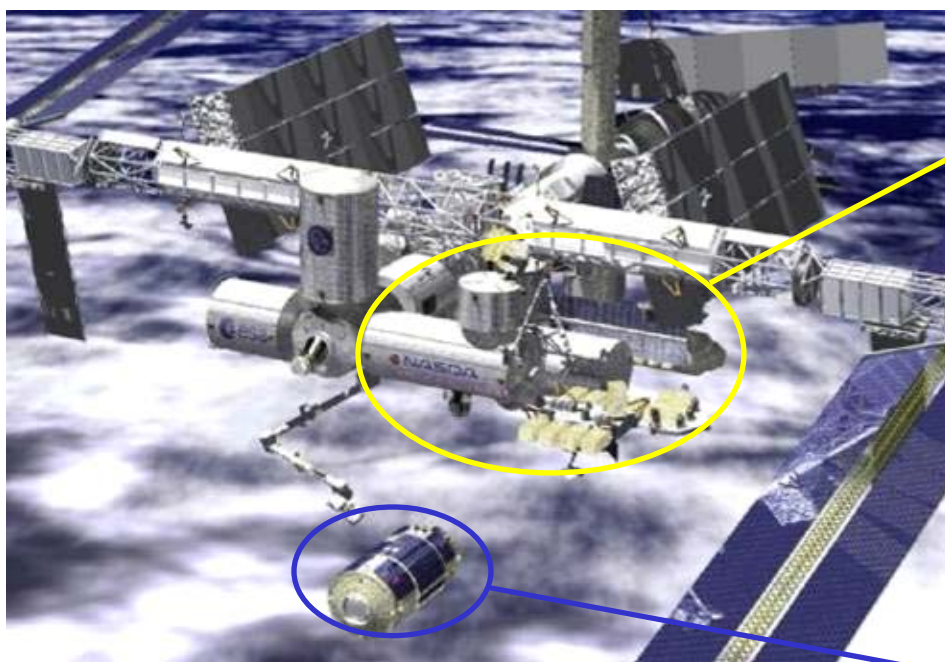
- JEM Payloads

Various payloads are under development for Microgravity Science, Life Science, and Earth Observation, and Astronomical Observation.

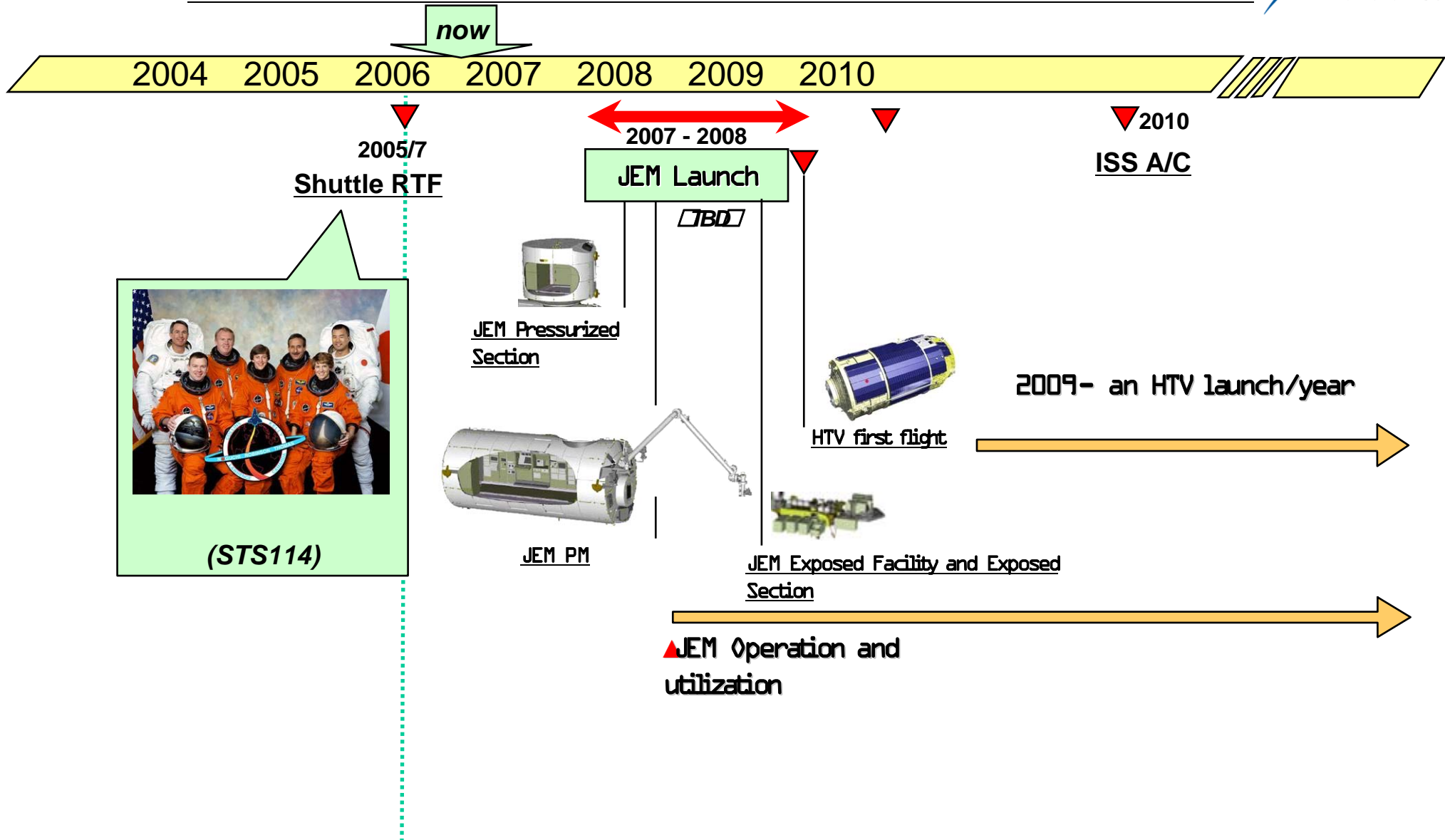
- H-II Transfer Vehicle (HTV)

HTV will carry both pressurized and un-pressurized cargos. First flight is expected in year 2009 and supply cargos once a year.

Japanese elements and payloads installed in the ISS

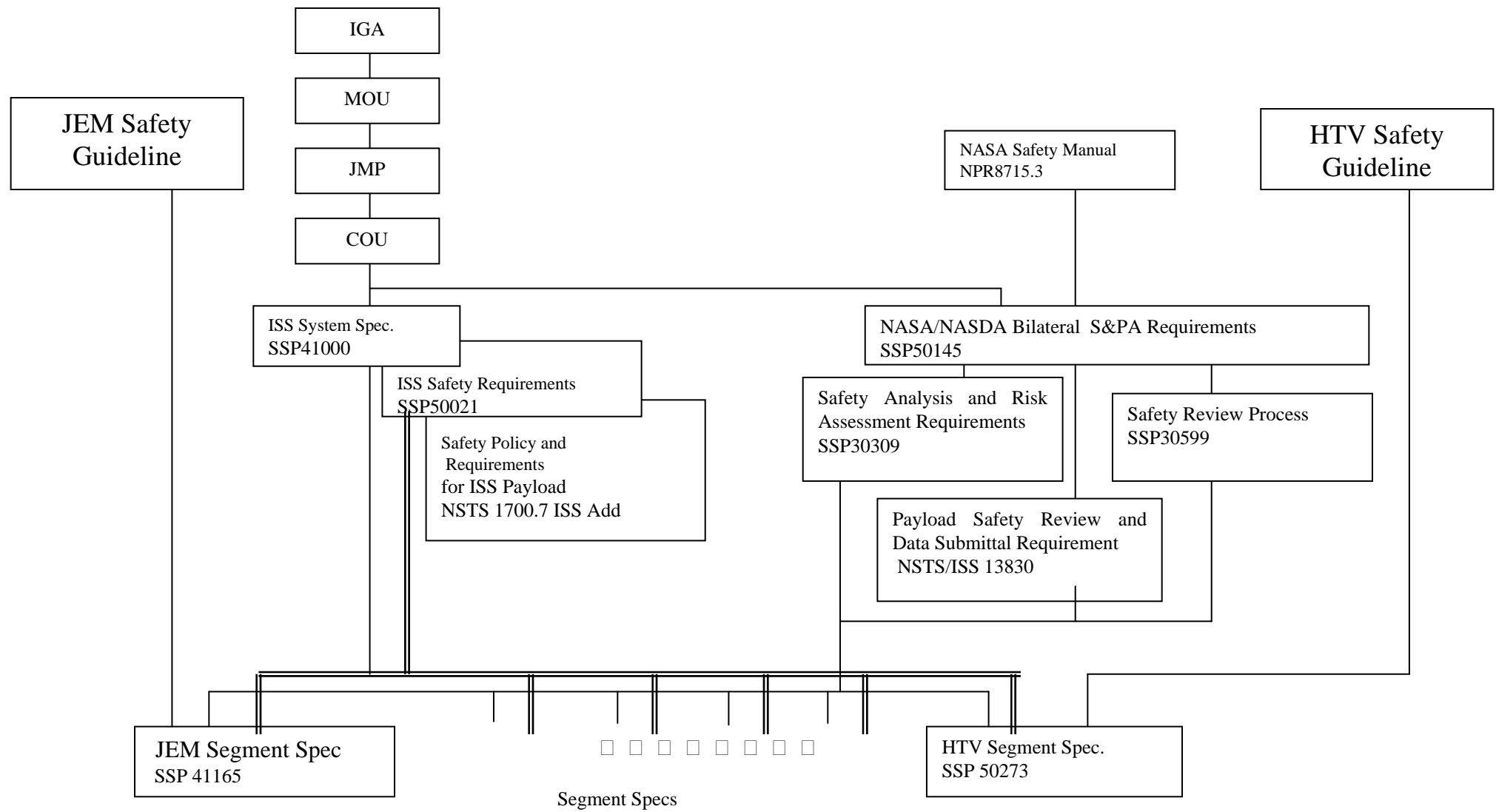


Schedule



JEM, JEM Payloads and HTV have to comply with both technical and programmatic safety requirements set by Japanese Space Activity Commission and multi-laterally agreed safety requirements for the ISS.

Safety Requirements for JEM and HTV

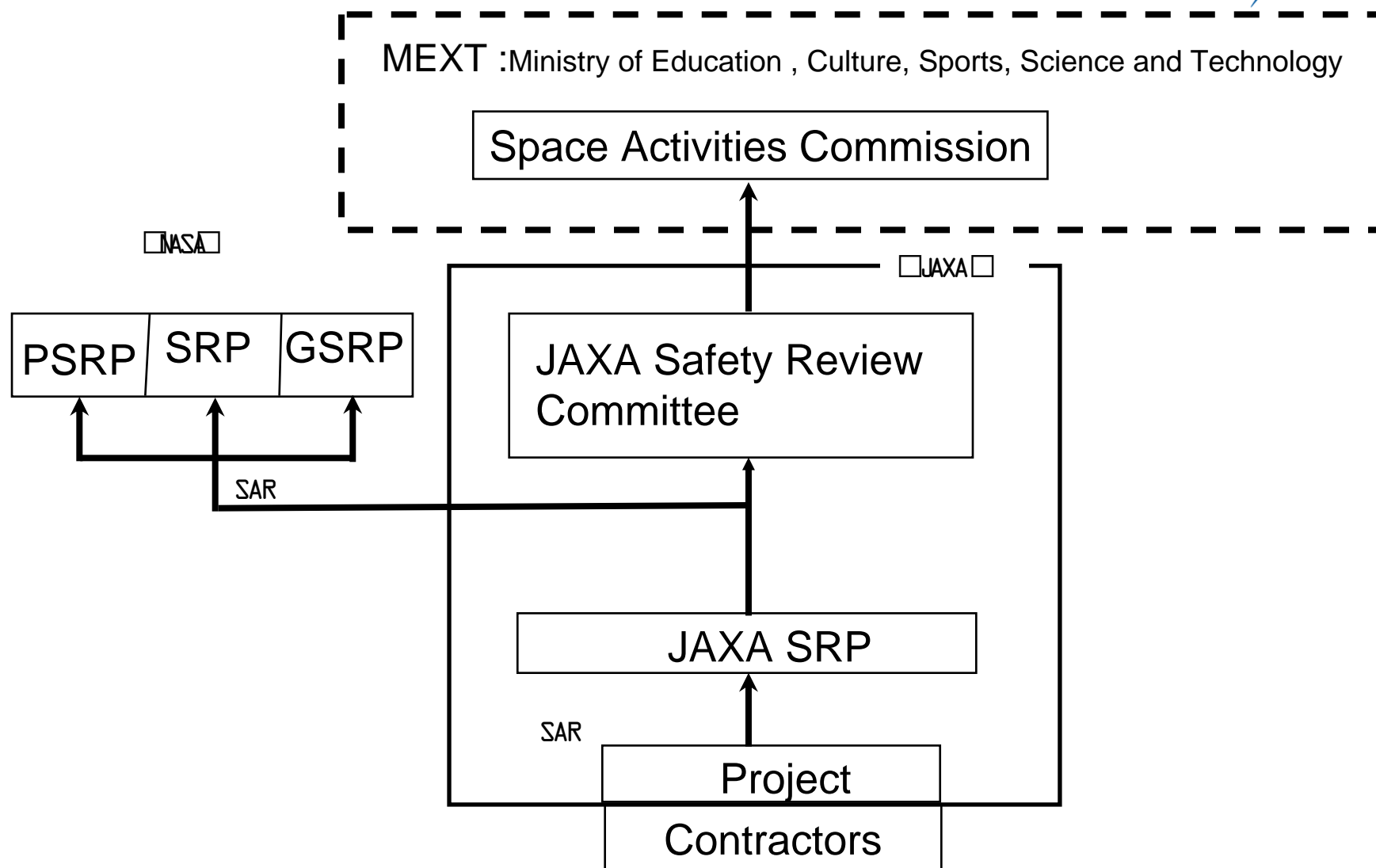
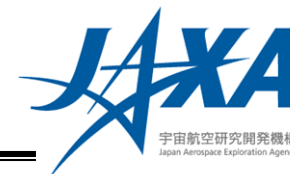


Process of Safety Assessment and Safety Review



- Safety assessment (Hazard Analysis) conducted by JAXA Projects and contractors
As a part of design activity
May hold internal safety review
- JAXA Safety Review Panel
Technical review to confirm design and operations of the system met not only requirements set by Space Activity Commission but also requirements agreed among ISS International Partners.
- NASA Safety Reviews
Technical review by NASA to confirm design and operations of the system met the ISS requirements (SRP, PSRP)
- JAXA Safety Review Committee
Comprehensive review based upon the JAXA Safety Review result
Chaired by JAXA vice president with JAXA top management
- Safety Review by Space Activity Commission
Comprehensive review to confirm design and operations of the system met the requirement set by Space Activity Commission based upon JAXA provided report

Safety Review Structure



JAXA Safety Review Panel



- Chaired by Director, S&MA as an independent authority
- Functions as System Safety Review Panel (SRP), Payload Safety Review Panel (PSRP), and Ground Safety Review Panel (GSRP) at NASA
- Supported by Fracture Control Board, M&P experts, Operations Community
- Software IV&V is conducted
- Ambiguous interpretation of safety requirements are coordinated with appropriate NASA safety review panel to have consistent criteria all over the ISS.
- Safety engineers participate in discussion in early stage of developing Safety Assessment Report (SAR). When the SAR is matured, safety engineers will propose to hold JAXA Safety Review Panel meeting.
- Payload safety review franchising is under coordination with NASA PSRP.

Hazards Identified in JEM

Following items were identified as the Hazard in the JEM . All Safety Review had been completed and JEM Pressurized Module shipped to KSC.

Hazard Group

- Fire
- Contamination
- Depressurization
- Structure Failure
- Explosion
- Collision
- Electrical Shock
- Temperature Extremes
- Sharp Edge/ Pinching point
- Excessive Noise
- Radiation

Safety Review by Space Activity Commission

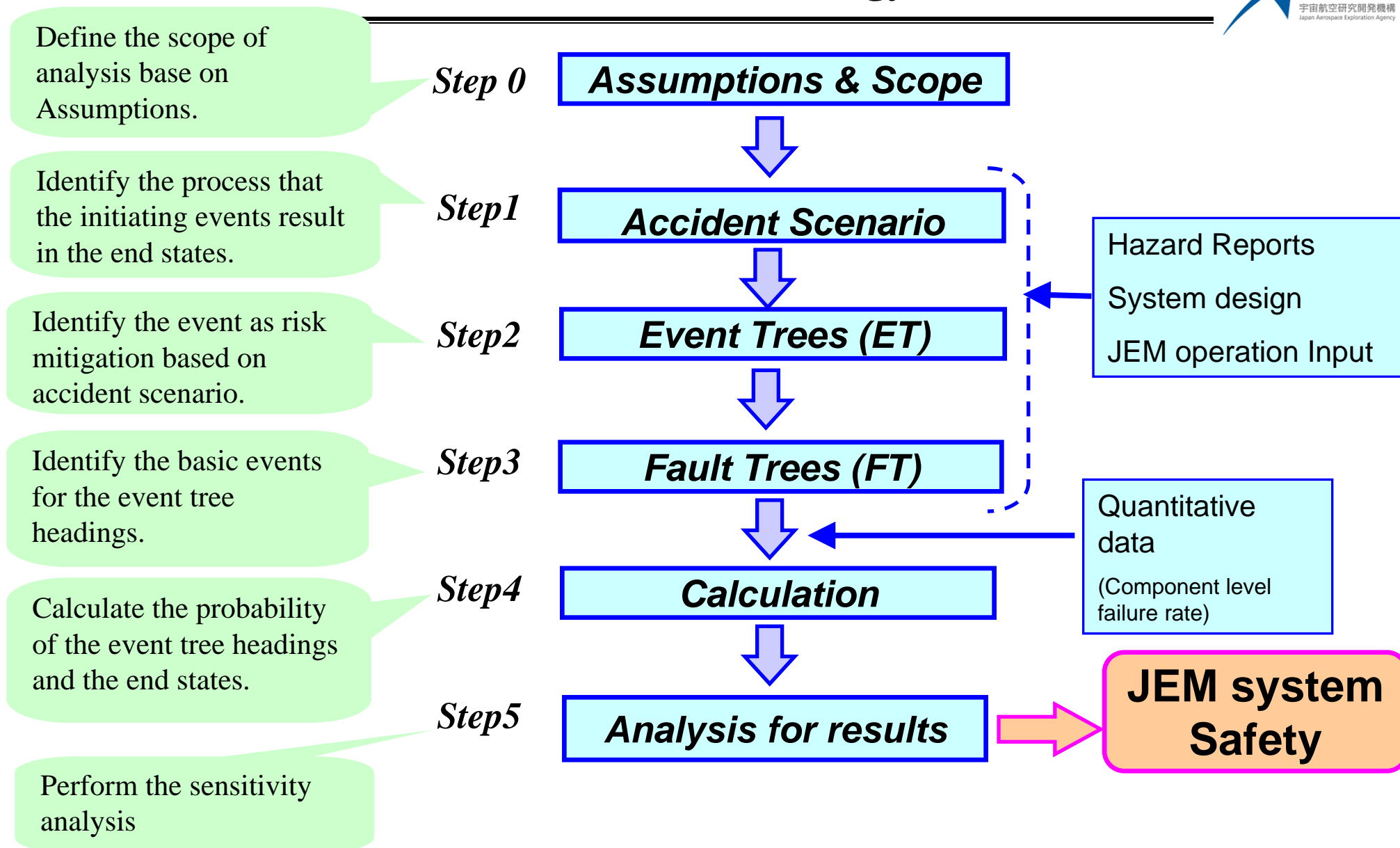


- Space Activity Commission sets comprehensive safety requirements for JEM and HTV.
- Reviews compliance of design and verification method of safety control after critical design phase was completed.
- Reviews verifications are properly completed.
- The Commission is composed of wide range of experts from not only space area but also other domain, which enables benchmarking

To understand safety risk more, quantitative safety assessment , namely Probabilistic Safety Assessment, is expected in addition to qualitative safety assessment. Methodology of the PSA and target setting to reflect the result of assessment are considered.

- To apply the fruits to on-orbit operations (JEM)
 - JEM PSA has been doing by following steps,
 - Depressurization from JEM Experiment Support Systems
 - Depressurization from JEM as a whole
 - Depress, fire, and contamination of JEM as a whole
- To apply to understand design (HTV)

JEM PSA Methodology



To Foster Safety for Future Manned Space Systems



- Safety assessment and safety review to ease participation of commercial users – more efficient and effective process

While, culture not to depreciate safety by the lightly standardized process.

- Secure ISS safety on orbit
 - Evaluation of non-conformances from the ISS safety point of view
 - Reflect knowledge gained from ISS previous operations for on-going ISS operations
 - Consideration for aging hardware
- Continual communication for commonly understood and agreed interpretation of safety requirement among ISS partners
- Safety for future exploration program
 - Evaluation if expansion of existing safety requirement/ interpretation can be appropriate
 - Safety without service for a long term
 - Loss of safety engineer, designer, and technician
 - Loss of manufacturing line
 - Research of formal software verification methodology applied to autonomous control system (including artificial intelligent system) Collaboration with academic/other-industry community to enhance existing IV&V technology